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AUTHORITY

ago ltr, 29 apr 1980

DEPARTMENT OF THE ARMY
OFFICE OF THE ADJUTANT GENERAL
WASHINGTON, D.C. 20310

IN REPLY REFER TO

AGAM-P (M) (3 Jul 69) FOR OT UT 692117 8 July 1969

SUBJECT: Operational Report - Lessons Learned, Headquarters, 36th Engineer Bn, Period Ending 30 April 1969

SEE DISTRIBUTION

1. Subject report is forwarded for review and evaluation in accordance with paragraph 5b, AR 525-15. Evaluations and corrective actions should be reported to ACSFOR OT UT, Operational Reports Branch, within 90 days of receipt of covering letter.

2. Information contained in this report is provided to insure appropriate benefits in the future from lessons learned during current operations and may be adapted for use in developing training material.

BY ORDER OF THE SECRETARY OF THE ARMY:

Kenneth G. Wickham

KENNETH G. WICKHAM
Major General, USA
The Adjutant General

1 Incl
as

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DEPARTMENT OF THE ARMY
HEADQUARTERS 36TH ENGINEER BATTALION (CONST)
APO San Francisco 96357

EGFE-OP 13 May 1969

SUBJECT: Operational Report -Lessons Learned (RCS-CSFOR R1) for Quarterly Period Ending 30 April 1969

Commander-in-Chief, United States Army, Pacific, ATTN: GPOP-OT, APO 96588
Commanding General, United States Army, Vietnam, ATTN: AVHGC-CH, APO 96307
Commanding Officer, 34th Engineer Group (Const), ATTN: EGF-OP, APO 96320

1. SECTION I, OPERATIONS - Significant Activities

a. On 15 February 1969 the battalion completed a significant upgrade of the Vinh Long Airfield. The project included soil stabilization and surface treatment of 108,000 square yards and construction of 88 aircraft revetments.

b. On 2 March 1969, C Co moved from the battalion cantonment at Vinh Long Airfield to a road camp 9 km south of Vinh Long city in order to expedite construction of National Highway 4.

c. On 28 March 1969, LTC V. D. Stipo assumed command of the battalion from LTC Richard E. Leonard.

d. During the period the battalion construction effort was almost entirely devoted to the restoration of National Highway 4 from My Thuan to Ba Cang in Vinh Long Province. The project requires repairing and upgrading 16 km of road and building 11 km of new road using clay-lime stabilization methods. As of 30 April 1969 progress on the new alignment included 5.7 km of embankment fill, 3.7 km of clay-lime subbase and 3.0 km of clay-lime-cement base course. Progress along the existing alignment included 8.6 km of sand fill, 8.5 km of sand-cement subbase, 6.7 km of rock base course and 4.3 km of surface treatment.

e. During the period the battalion received unusually large quantities of construction materials for National Highway 4 including 4,000 short tons of lime and an equal amount of cement. Since existing port faciilities in Vinh Long were not sufficient to handle such quanities of cargo, the battalion became heavily involved in off-loading operations.

f. During the period the battalion continued operation of the Vinh Long rock off-loading facility. Monthly production established successive records of 17,000 tons in February, 22,500 tons in March and 26,700 tons in April. The April total was the largest for any facility in the Delta.

g. During the period the battalion placed in operation two field water purification plants. One 1500-gph Erdlator has supplied the C Company road camp on National Highway 4 and another 1500-gph Erdlator has augmented water production at Vinh Long Airfield. The Vinh Long facility has been producing 25,000 gallons of purified water daily.

FOR OT UT

692117

Inclosure

EGFE-OP 13 May 1969
SUBJECT: Operational Report - Lessons Learned (RCS-CSFOR R1) for Quarterly Period Ending 30 April 1969

h. During the period the battalion was augmented with commercial, off-the-shelf construction equipment under the LOC-MCA equipment program. As of 30 April 1969, 23 pieces of equipment had been received including a self-propelled soil stabilizer, self-propelled vibratory rollers, segmented compactors, Jersey spreaders and hand tampers.

i. During the period 234 personnel were received and processed by the battalion as replacements for rotational losses. The battalion out-processed 327 personnel for reassignment or separation.

j. During the period the battalion had 34 attached personnel in support of the National Highway construction mission from other battalions within 34th Engr Gp.

k. During the period the battalion hired 169 local national civilians increasing the labor force from 81 to 250 civilian personnel. The battalion authorization is 387. A hiring freeze directed by HQ, USARV, on 28 March 1969 prevented further additions to the civilian force.

l. During the period the battalion suffered three officers wounded in action. Two were medically evacuated and one was treated and returned to duty.

m. During the period the battalion expended 77 days performing its construction and support missions, 6 days undergoing mandatory training and 6 days non-duty time.

2. SECTION I, OPERATIONS - Organization

a. Organic Units

(1) HHC, 36th Engineer Battalion (Const)
(2) A Company, 36th Engineer Battalion (Const)
(3) B Company, 36th Engineer Battalion (Const)
(4) C Company, 36th Engineer Battalion (Const)
(5) D Company, 36th Engineer Battalion (Const)

b. Operational Control

(1) Second Platoon, 523rd Engineer Company (PC)

3. SECTION II, LESSONS LEARNED - Commander's Observations, Evaluations and Recommendations.

a. Personnel: None

b. Operations

(1) Delta Terrain

(a) Observation: The Mekong Delta is not "flat".

EGFE-OP 13 May 1969
SUBJECT: Operational Report - Lessons Learned (RCS-CSFOR R1) for Quarterly Period Ending 30 April 1969

(b) Evaluation: Survey work on National Highway 4 revealed that the apparently flat delta terrain was actually composed of hills and swales. Additional fill was required in the swales to bring the road up to grade. Material from the swales was not desireable as embankment fill.

(c) Recommendation: That this terrain variation be considered in construction planning for the Delta.

(2) Draining Rice Paddies

(a) Observation: Efforts by U.S. troops to drain rice paddies and gain access for earthmoving equipment were only partially successful.

(b) Evaluation: Battalion personnel learned the irrigation methods of the local rice farmers, flooding the paddies at high tide and draining the paddies at low tides. However the U.S. troops could not accomplish the task as quickly and efficiently as the local farmers. The farmers know the process intimately from a lifetime of experience. It would be desireable to contract the job to local village and hamlet officials but there is no simple means of doing so. An alternative solution was the employment of 100 daily-hire personnel from the nearby villages. These people accomplished the job more successfully than U.S. troops and required minimum U.S. supervision.

(c) Recommendation: That daily-hire local nationals be used to drain rice paddies.

(3) Draining Rice Paddies

(a) Observation: Considerable differences were noted in the drainage of different rice paddies.

(b) Evaluation: Paddies are not all at the same elevation. A difference in elevation of six inches can mean the difference between standing water and semi-dry areas; between inaccessible clay and easily accessible borrow areas. Paddies which are farther away from main streams are less affected by tidal action with only the monthly tidal extremes being noticeable. These paddies which are farther from main streams are more difficult to drain and take longer to drain by tidal means, than paddies near the main streams. The problem areas can be drained by building dikes with dozers and using large-capacity pumps to remove the water from the diked area.

(c) Recommendation: That these methods be used to drain paddies during future Delta LOC construction.

(4) Construction in Rice Paddies

(a) Observation: Working in wet areas of the rice paddies caused much lost time.

EGFE-OP 13 May 1969
SUBJECT: Operational Report - Lessons Learned (RCS-CSFOR R1) for Quarterly Period Ending 30 April 1969.

(b) Evaluation: Certain low areas in the rice paddies were never adequately drained. Attempts to construct the embankment fill by the usual method of dozers pushing toward the centerline were not successful. The method used was to bridge the wet sections with dry clay hauled from borrow areas by scrapers and placed by dozers. The borrow areas were developed by searching for the highest sections of the paddies and diking them off from lower surrounding paddies.

(c) Recommendation: That borrow areas be developed and wet areas bridged by the above method in future Delta LOC construction.

(5) Temporary Class-120 Bridge

(a) Observation: A simple, easily erected, temporary class-120 bridge was needed.

(b) Evaluation: A small canal across the centerline of National Highway 4 had to be bridged so earthmoving equipment could continue work. A timber trestle bridge was adequate for the class-25 dozers However, it was desireable to haul fill over the canal in 18-CY scrapers (class-111 load). The necessary bridge was erected by placing 40-ft bearing piles (14BP73) side-by-side across a 15-foot gap using timber sills. Calculations showed the soil bearing pressure to be greater than 400 psf, so the bridge was designed with a soil bearing stress of 390 psf. When a permanent bridge is erected on the site, the bearing piles will be recovered and used for their original purpose.

(c) Recommendation: That this design be considered when a temporary class-120 is required.

(6) Compaction of Clay-Lime-Cement Base Course

(a) Observation: Compaction obtained in a clay-lime-cement base course seemed to vary considerably in spite of careful control of moisture and compactive effort.

(b) Evaluation: Delta clay is a hetrogeneous material. Typical maximum modified AASHO densities for clay-lime-cement varied from 92 pcf to 110 pcf. This presented a problem in the measurement of compaction. The solution was to plot a family of curves of dry density vs moisture content for different samples compacted by the modified AASHO method. When determining percent compaction in the field, in-place density is taken with a nuclear density meter, and a sample is also taken. The sample is compacted in a mold according to the modified AASHO method and dry density and moisture content are determined. This information is plotted on the family of curves. (See Inclosure 1). The closest fit will identify maximum modified AASHO density and permit calculation of percent compaction.

(c) Recommendation: That this method be used to measure compaction in lime-cement stabilization of hetrogeneous clay.

EGFE-OP 13 May 1969
SUBJECT: Operational Report - Lessons Learned (RCS-CSFOR R1) for Quarterly Period Ending 30 April 1969

(7) Erosion Control

(a) Observation: Wind and rain were eroding sand from beneath the foundations of buildings in the battalion area.

(b) Evaluation: The 36th Engineer Battalion is located on a sand-filled area adjacent to a helicopter parking apron. Most of the structures are slab on grade or are on wooden footings. Wind or prop wash, and water, erode the sand away from the buildings, especially at the corners causing the foundations to be undermined. To prevent this erosion a strip approximately 18-inches wide around the buildings was coated with peneprime.

(c) Recommendation: That erosion control techniques, particularly peneprime, be used around building foundations in sandy areas.

(8) Sealing Corrugated Metal Roofs

(a) Observation: Corrugated metal roofs had to be sealed before the beginning of monsoon season and roofing cement was not available.

(b) Evaluation: A suitable substitute for roofing cement had to be found. Experimentation with various asphalt products indicated that the best sealing compound was a combination of RC-800 and sand. Joints were painted with RC-800 then sprinkled with sand. The sand absorbed excess RC-800, gave it body, and prevented it from running.

(c) Recommendation: That RC800 and sand be used when necessary as substitute for roofing cement.

(9) Bridge Construction in the Delta

(a) Observation: A 20-ton truck-mounted crane can be used successfully for the construction of 120-ft bridges in the delta.

(b) Evaluation: During construction of permanent pile-bend bridge for National Highway 4 it was necessary to drive piles near the center of a canal. Load limitations prevented use of a longer boom. A larger crane was not available. The canal was shallow but had to remain open to sampan traffic. Earth fill was pushed out from the bank of the canal and compacted by dozers to form a finger. The finger was long enough to permit the crane to drive pile for the center bent. Afterward the fill was excavated with a clam and the canal restored to its original condition.

(c) Recommendation: That this method be used as required for bridge construction in the delta.

(10) Lime Stabilization

(a) Observation: The recommended procedure for placing lime was too slow.

EGFE-OP 13 May 1969
SUBJECT: Operational Report - Lessons Learned (RCS-CSFOR R1) for Quarterly Period Ending 30 April 1969

(b) Evaluation: The procedure recommended for placing lime in a clay stabilization manual prepared for the USARV Engineer is to place lime sacks by hand on the surface to be stabilized. On the National Highway 4 project at least 600 meters of roadway had to be stabilized per day in order to meet the scheduled completion date. Hand placing the lime sacks could only achieve a production rate of 120 meters per day. Instead 290M tractors with pans were used to spread lime on the roadway. The pans were loaded with lime at night from an elevated platform by a twelve-man crew. The crew could load twelve pans in nine hours with a forklift placing pallets of lime on the elevated platform. Each pan was loaded with enough lime to stabilize 50 meters of road plus 10% for loss during loading or hauling. The pans were carefully controlled to insure that the lime was spread over a 50-meter section. (Pans would spread lime as soon as they arrived on the job site, then spend the rest of the day hauling clay). Lime percentages on the roadway were well within specifications and the 600-meter daily rate was achieved.

(c) Recommendation: That 290M tractors with pans be used to spread lime instead of hand-placing lime sacks.

c. Training: None

d. Logistics: None

e. Maintenance:

(1) D7E Dozers in Rice Paddies

(a) Observation: When working in wet rice paddies D7E dozers frequently overheated.

(b) Evaluation: Dozer radiators and belly pans quickly filled with mud and rice straw when operating in the paddies. There does not seem to be any way of preventing this accumulation, other than frequent cleaning of the radiators and belly pans. These parts were thoroughly cleaned at least twice weekly to reduce overheating. Hinged belly pans were considerably easier to clean than bolted pans.

(c) Recommendation: That radiators and belly pans of dozers operating in rice paddies be cleaned frequently.

2. Hyster Segmented Compacter Hydraulic Tanks

(a) Observation: The front hydraulic tanks on a Hyster 450A segmented compactor developed leaks.

(b) Evaluation: Welds on the tank cracked repeatedly. The tank is made of thin material and is bolted to three separate frame sections. Stresses induced by the normal deformation of the frame cracked the welds on the tank. The situation improved considerably when a bolt which connected the tank to the rear engine support member was left out. The tank is still adequately supported, but not as rigidly mounted.

EGFE-OP 13 May 1969
SUBJECT: Operational Report - Lessons Learned (RCS-CSFOR R1) for Quarterly Period Ending 30 April 1969

(c) Recommendation: That the above procedure be used to prevent cracked hydraulic tanks and that a possible modification be considered.

f. Supply: None

g. Medical:

(1) Contact Dermatitis from Lime Dust.

(a) Observation: A significant number of troops have contact dermatitis to lime and cement.

(b) Evaluation: A small but significant number of personnel have marked skin reactions from even brief exposure to powdered lime and cement manifested by weeping and crusting skin eruptions, especially around the surfaces of the forearms. The severity of the disorder is proportional to the time and concentration of exposure. Early identification, vigorous treatment, and early removal from the hostile environment is mandatory.

(c) Recommendation: That personnel working with lime and cement be carefully observed for the first few days to identify, treat, and reassign those developing contact dermatitis.

(2) Skin and Eye Leisons from Lime Dust

(a) Observation: Personnel working in high concentrations of lime dust develop skin and eye leisons.

(b) Evaluation: Those personnel working for long periods of time in high concentrations of lime dust develop ulceration of the skin and mucous membranes. Frequency of leisons decreased with the use of facial masks and goggles. Also effective are opportunities for showers during the work period and frequent rotation of personnel working with lime.

(c) Recommendation: That the above precautions, especially frequent rotation of personnel, be observed when working with lime dust.

(3) Location of Lime Facility

(a) Observation: Contact dermatitis, skin leisons, and respiratory problems also develop in personnel not actually working with lime dust but who live or work downwind from lime handling areas.

(1) Evaluation: A lime-handling facility must be carefully located to insure that no personnel are living or working downwind. Wind direction is seasonal in Vietnam so it is likely that no one location will be sufficient for continuous operation. The platform used for lime loading by the battalion is moveable and has been relocated with a forklift as required.

EGFE-OP 13 May 1969
SUBJECT: Operational Report - Lessons Learned (RCS-CSFOR R1) for Quarterly Period Ending 30 April 1969

(c) Recommendation: That a lime-handling area be carefully sited to avoid downwind exposure and that facilities be easily moveable.

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V. D. STIPO
LTC, CE
Commanding

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EGF-OP (13 May 69) 1st Ind
SUBJECT: Operation Report of 36th Engineer Battalion (Const) for Period Ending 30 April 1969, RCS CSFOR-65 (R1)

DA, HEADQUARTERS 34th ENGINEER GROUP (CONST), APO 96320

TO: Assistant Chief of Staff for Force Development, Department of the Army, Washington, D.C., 20310
Commanding Officer, 20th Engineer Brigade, ATTN: AVBI-OS, APO 96491

1. The subject report submitted by the 36th Engineer Battalion has been reviewed by this headquarters and is considered comprehensive and of value for documentation and review of the reporting units activities and experiences.

2. This headquarters concurs in the recommendations of the submitted report with the following comment:

Ref para 2b, page 3: Hiring large numbers of local nationals for any type project is feasible only when substantial funds are available on short notice. Such is not the case without seriously depleting funds previously allocated of other units within the Group. For this reason it is further recommended that a careful study be made of each project relative to overall benefit derived and expenditure of limited funds.

FOR THE COMMANDER:

DONALD L WHEELER LTC
Major, AGC
Adjutant

Copy Furnished:
CO, 36th Engr Bn

AVBI-OS (13 May 69) 2nd Ind

SUBJECT: Operational Report of 36th Engineer Battalion (Const) for Period Ending 30 April 1969, RCS CSFOR-65 (R1)

DA, HEADQUARTERS, 20TH ENGINEER BRIGADE, APO 96491

TO: Commanding General, United States Army Vietnam, ATTN: AVHGC-DST, APO 96375

1. Submitted in accordance with USARV Regulation 525-15, dated 13 April 1968.

2. Subject report for the 36th Engineer Battalion (Const) has been reviewed and is considered adequate.

FOR THE COMMANDER:

J. J. MONTGOMERY
Major, AGC
Adjutant

Copies Furnished:
CO, 34th Engr Gp
CO, 36th Engr Bn

AVHGC-DST (13 May 69) 3d Ind
SUBJECT: Operational Report-Lessons Learned (RCS-CSFOR R1) for Quarterly Period Ending 30 April 1969

HEADQUARTERS, UNITED STATES ARMY, VIETNAM, APO San Francisco 96375 12 JUN 1969

TO: Commander in Chief, United States Army, Pacific, ATTN: GPOP-DT, APO 96558

1. This headquarters has reviewed the Operational Report-Lessons Learned for the quarterly period ending 30 April 1969 from Headquarters, 36th Engineer Battalion (Construction).

2. Comments follow:

a. Reference item concerning Hyster Segmented Compacter Hydraulic Tanks, section II, page 6, paragraph e(2); nonconcur. Subject equipment is not military standard equipment but is one of many commercial items purchased for the RVN Lines of Communication Improvement program. The problem discussed in this ORLL is presently being evaluated by the USARV Engineer. Modification of this equipment is not authorized at this time. The USARV Engineer evaluation will determine if a modification or field fix is warranted. No further action required by higher headquarters.

b. Reference the item concerning Contact Dermatitis from Lime Dust, Section II, page 7, paragraph g(1); concur. This lesson learned will be included in the June 1969 USARV Commander's Notes.

FOR THE COMMANDER:

A.R. GUENTHER
CPT, AGC
ASST ADJUTANT GENERAL

Cy furn:
36th Engr Bn
20th Engr Bde

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GPOP-DT (13 May 69) 4th Ind
SUBJECT: Operational Report of HQ, 36th Engr Bn (Const) for Period Ending 30 April 1969, RCS CSFOR-65 (R1)

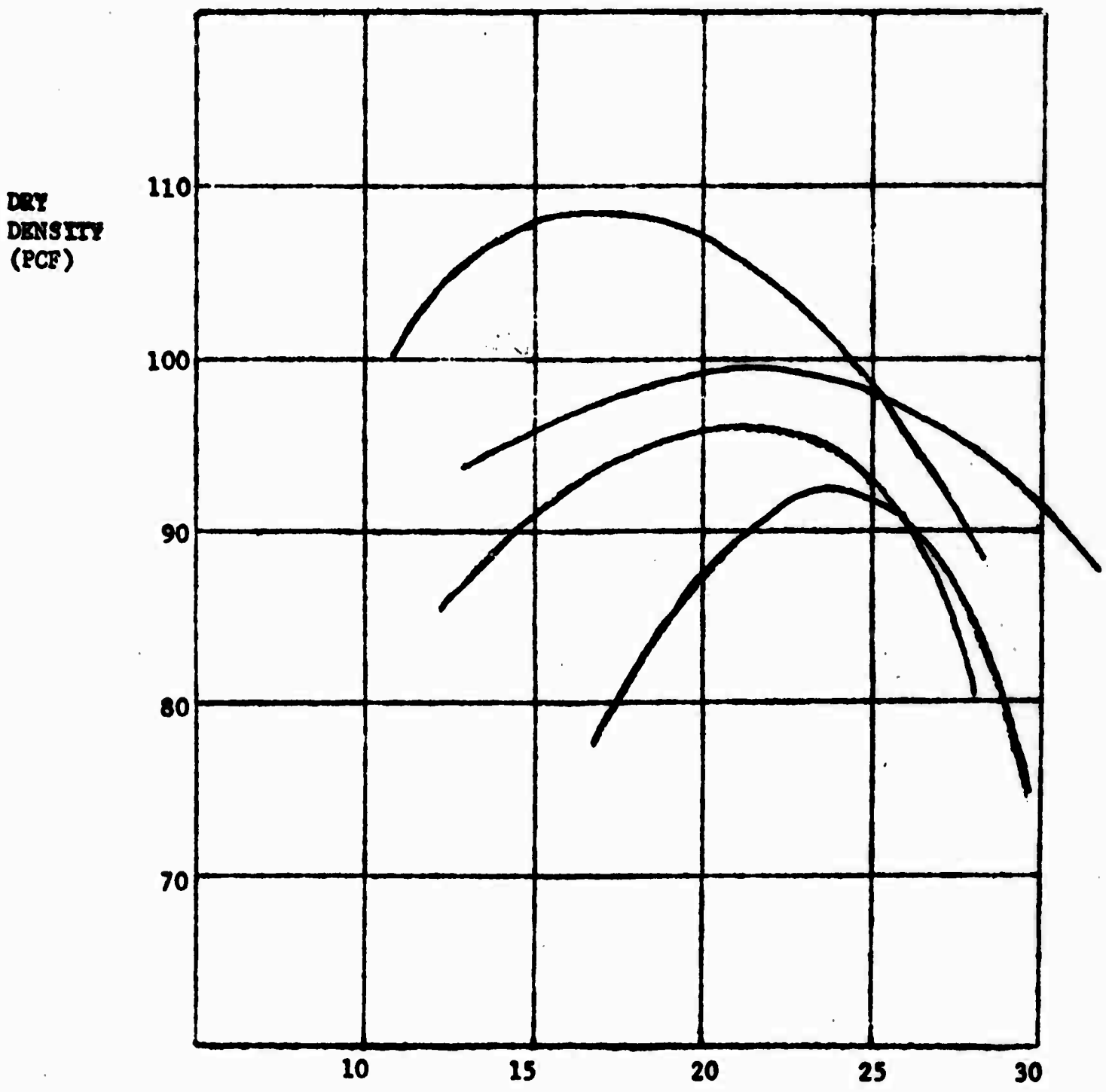
HQ, US Army, Pacific, APO San Francisco 96558 26 JUN 69

TO: Assistant Chief of Staff for Force Development, Department of the Army, Washington, D. C. 20310

This headquarters has evaluated subject report and forwarding indorsements and concurs in the report as indorsed.

FOR THE COMMANDER IN CHIEF:

C. L. SHORTT
CPT, AGC
Asst AG



Family of curves for determination of maximum modified AASHO density of clay-lime-cement on QL-4.

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UNCLASSIFIED
Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY *(Corporate author)* HQ, OACSFOR, DA, Washington, D. C. 20310	2a. REPORT SECURITY CLASSIFICATION For Official Use Only 2b. GROUP

3. REPORT TITLE

Operational Report - Lessons Learned, Hq, 36th Engineer Bn

4. DESCRIPTIVE NOTES *(Type of report and inclusive dates)*

Experiences of unit engaged in counterinsurgency operations, 1 Feb 69 to 30 Apr 69.

5. AUTHOR(S) *(First name, middle initial, last name)*

CO, 36th Engineer Bn

6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
13 May 1969	16	

8a. CONTRACT OR GRANT NO. b. PROJECT NO. c. N/A d.	9a. ORIGINATOR'S REPORT NUMBER(S) 692117 9b. OTHER REPORT NO(S) *(Any other numbers that may be assigned this report)*

10. DISTRIBUTION STATEMENT

11. SUPPLEMENTARY NOTES N/A	12. SPONSORING MILITARY ACTIVITY OACSFOR, DA, Washington, D.C 20310

13. ABSTRACT

DD FORM 1 NOV 68 1473

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